

REMARKS

Claims 33 and 35 were objected to. The Applicants have amended claims 33 and 35 to address the objectionable informalities.

Claims 1-3 and 7 were rejected under 35 USC 103(a) as being unpatentable over the Applicant's acknowledged prior art (Background of Invention) in view of Arney et al (US Patent 5,808,781).

Claims 5, 6 and 27 were rejected under 35 USC 103(a) as being unpatentable over the Applicant's acknowledged prior art in view of Arney as applied to claims 1-4 and 7 above, and further in view of Furukawa et al (US Patent 5,238,636).

Claims 32 and 33 were rejected under 35 USC 103(a) as being unpatentable over the Applicant's acknowledged prior art in view of Arney as applied to claim 1 above, and further in view of Hayashi et al (US Patent 6,808,652 B2).

Claims 12-13 and 38 were rejected under 35 USC 103(a) as being unpatentable over the Applicant's acknowledged prior art in view of Nishimura et al (US Patent 5,141,461).

Claim 35 was rejected under 35 USC 103(a) as being unpatentable over the Applicant's acknowledged prior arts in view of Nishimura as applied to claim 12 above, and further in view of Nishimura (US Patent 4,133,798) refers to as Nishimura2.

The examiner rejects several claims based on disclosures by Arney ('781). The examiner states that "Arney teaches in Fig 1 and 14 a moveable film 15 formed on a substrate having pores. ... Furthermore, Arney teaches using a gas pump to regulate the gas pressure between the film and the substrate through which the moveable film moves to vary optimizing damping (col 6, lines 13-34)" on page 4, third paragraph 3.

The present invention is directed to a porous optical switch film or an optical device employing a porous optical switch film. The porous optical switch film has randomly placed pores throughout. In sharp contrast, the cited art discloses predetermined areas for pores to reside in a film. Consequently there are specific areas of film having no pores whatsoever. For example, see centrally located region 16 of Fig. 2 in Arney '781. This specific region is devoid of holes 14, because placement of holes in the centrally located region 16 would negatively impact the type of operation of the Arney device. (See, Col. 4, lines 12-30).

Conversely, the random placement of pores in Applicants film minimizes the pressure differential between the film and a corresponding plate, thus enabling faster switching times at substantially lower voltages in an ambient environment than previously disclosed in the prior art. The Applicants claimed invention has no such restriction on the placement of the pores that would negatively impact its operation. (See, Applicants' Figs. 4-7 showing random pore placement). In fact, the opposite is true. More randomly placed holes allow faster switching times. Thus, the cited art of Arney specifically teaches away from Applicants' claimed invention.

A careful reading of Arney reveals that the size and spacing of the holes is critical to the operation of the optical modulator of '781 (see col 6, lines 13-35). As described by Arney "... the holes should be arranged along a square or hexagonal array. The holes are sized and spaced to optimize damping of the membrane." Arney goes on to describe mathematical formulae for optimal size and spacing of the holes. In particular, Arney specifies that "No holes are placed in a region near the center of the membrane which forms an optical window" (see col 2, lines 36-38 of '781 or alternatively col 7, lines 41-53 of '781). Accordingly, Arney's requirement of precise control of hole size and spacing adds greatly to cost and complexity to the device. In contrast, the optical switch device of the instant invention does not require precise sizing or spacing of the holes (also termed microvoids in Applicants' specification) in the membrane (see Figs. 5-7 of the instant invention). In addition, the optical switching film of the instant invention does not require a central "optical window" as described by Arney.

Moreover, it should be noted that Arney is seeking to “dampen” or restrict the motion of the membrane. This is because Arney is using a stiff inorganic material as a membrane “the membrane 15 is preferably silicon nitride” (see col 5, lines 26-27 of ‘781). In contrast, the problem addressed in the instant invention is exactly opposite to the problem addressed by Arney’s teachings. Specifically, the instant invention seeks a flexible optical film that moves rapidly and easily between two substrates. For this reason, the optical switch film of the instant invention is very flexible, rather than stiff as in Arney ‘781; and the optical switch film of the instant invention is comprised of a highly flexible organic polymer. Thus, because Arney seeks to retard membrane motion, she is actually teaching away from the use of holes or microvoids to facilitate rapid motion of an optical switch device as claimed and taught by the Applicants of the instant invention.

The Applicants would also like to emphasize that operation at low switching voltages is a critical aspect of the instant invention, rather than a mere optimization as suggested by the Examiner. Low switching voltages ensure that the switch may operate rapidly as needed for video rates in optical display devices. At higher voltages, the optical switch film couples tightly with the substrate and may adhere to the substrate even when the voltage is reversed. This effectively renders the optical switch film useless for a practical optical display device and may even permanently damage the optical switch film.

Finally, it should be noted that Arney’s use of a stiff and brittle membrane material (i.e. silicon nitride) precludes its use as a flexible display device. A flexible display device is one object of the instant invention, as noted in Applicants’ background discussion.

Furthermore, Nishimura et al. also does not disclose randomly placed pores in a multi-layered composite film. Nishimura is directed toward the formation of a black layer and a phosphor layer onto a metal transferring sheet (substrate). Nishimura’s films are composite, but not simultaneously coated (i.e. the black layer and phosphor layer are not simultaneously applied to the substrate) as in the instant invention. Nishimura’s films are not porous. Nishimura’s films are not transparent.

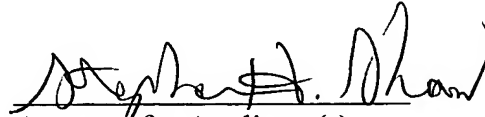
Nishimura'461 does not teach simultaneous coating. Nishimura2 only appears to disclose the coating of a film with UV absorbing compounds to reduce UV transmittance. Nishimura2 does not teach simultaneous multilayer coating of transparent films as claimed in the instant invention. Accordingly, the Examiner has failed to make a prima facie case, because at least one of Applicants' features is missing in the cited combination.

The Applicants have amended claims 1,12, and 38 to emphasize the random placement of the pores within the optical switching film. It is believed that independent claims 1 and 12 are unobvious in light of the combination of Applicants' background of invention in view of Arney; and in light of the combination of Applicants' background of invention in view of Nishimura. The remaining claims are dependent from these claims and are considered to be patentable for at least the same reasons.

It is believed that these changes now make the claims clear and definite and, if there are any problems with these changes, Applicants' attorney would appreciate a telephone call.

In view of the foregoing, it is believed none of the references, taken singly or in combination, disclose the claimed invention. Accordingly, this application is believed to be in condition for allowance, the notice of which is respectfully requested.

Respectfully submitted,


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If the Examiner is unable to reach the Applicant(s) Attorney at the telephone number provided, the Examiner is requested to communicate with Eastman Kodak Company Patent Operations at (585) 477-4656.